

CLAIMS

1. A loudspeaker, comprising:
 - a hollow frame provided with a first opening and a second opening
 - 5 facing the first opening;
 - a magnet provided inside the frame and having a first pole and a second pole facing the first opening and the second opening, respectively;
 - a plate made of a magnetic material, which is provided in contact with the first pole of the magnet;
 - 10 a yoke made of a magnetic material, which is provided in contact with the second pole of the magnet, forms magnetic flux flow between the first pole and the second pole and has a groove portion on a surface facing the second opening;
 - a first voice coil having a first end located in a magnetic gap provided
 - 15 between the plate and the yoke,
 - a first diaphragm bonded to a second end of the first voice coil and bonded to the first opening of the frame at its outer periphery;
 - a second voice coil having a first end located in the groove portion;
 - and
 - 20 a second diaphragm bonded to a second end of the second voice coil and bonded to the second opening of the frame at its outer periphery.
2. The loudspeaker according to claim 1, wherein the yoke has a U-shaped cross section and has an outer wall portion supported by an inner
- 25 wall of the frame, the magnet is provided inside the yoke, and the magnetic gap is provided between the outer wall portion of the yoke and the plate.

3. The loudspeaker according to claim 1, wherein the magnet and the plate are provided with a through hole in a center part thereof, the yoke has a center pole located in the through hole of the magnet and the plate, and the
5 magnetic gap is provided between the center pole of the yoke and the plate.

4. The loudspeaker according to claim 1, wherein the groove portion has a width and a depth to allow a magnetic pathway of a magnetic circuit , which is formed of the magnet, the yoke, the magnetic gap and the plate, to
10 be magnetically saturated at a location of the groove portion.

5. The loudspeaker according to claim 1, wherein the yoke has a standing wall provided at at least one side of the both sides of the grove.

15 6. The loudspeaker according to claim 1, wherein the frame and the yoke are integrated with each other.

7. A mobile telephone, comprising:
the loudspeaker described in claim 1,
20 a transmitter-receiver for transmitting/receiving an originating signal, an incoming signal and a signal including sound data to/from an outside;

a control part releasing ringtone from a first diaphragm of the loudspeaker based on the incoming signal received via the
25 transmitter-receiver, and releasing ringtone from a second diaphragm of the loudspeaker based on the signal including sound data received via the

transmitter-receiver;

a microphone for inputting a sound signal transmitted to the control part; and

an input part for receiving input of information about originating and
5 incoming, and transmitting the information to the control part.

8. A method for manufacturing the loudspeaker described in claim 1, the method comprising steps of:

A) providing the yoke with the groove portion;

10 B) bonding the yoke and the magnet together;

C) bonding the magnet and the plate together;

D) disposing the first end of the first voice coil in the magnetic gap;

E) bonding the second end of the first voice coil to the first diaphragm;

15 F) disposing the first end of the second voice coil in the groove portion; and

G) bonding the second end of the second voice coil to the second diaphragm.

20 9. The method for manufacturing the loudspeaker according to claim 8, wherein in the step A, the groove portion is formed by forging at a time when, before or after the yoke is formed.

10. The method for manufacturing the loudspeaker according to claim 8,
25 wherein in the step A, the groove portion is formed by casting when the yoke is formed.

11. The method for manufacturing the loudspeaker according to claim 8, further comprising a step H) of integrating the frame with the yoke by insert molding an outer wall of the yoke into the frame.